



United States Department of Agriculture

Bar X Allotment & Heber-Reno Sheep Driveway Grazing Authorization

Preliminary Environmental Assessment



Forest Service

Tonto National Forest,
Pleasant Valley Ranger District

March 2019



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Chapter 1: Purpose Of and Need for Action

Project Area Description and Location

Bar X

The combined Bar X, Colcord Canyon, Haigler Creek, and Young grazing allotments, henceforth referred to as **Bar X**, are located on the Pleasant Valley Ranger District, approximately eight miles north of Young, Arizona in Gila County (Figure 1). It encompasses a total area of 27,423 acres spread out over 23 pastures and holding areas. Pastures range in size from 675 acres to 10,900 acres. The Red Lake, Gentry Mountain, and Pleasant Valley allotments form Bar X's eastern boundary, Marsh Creek allotment is to the west, and 13 Ranch and Ellinwood allotments are the northern boundaries. The Heber-Reno Sheep Driveway bisects the allotments diagonally from northeast to southwest.

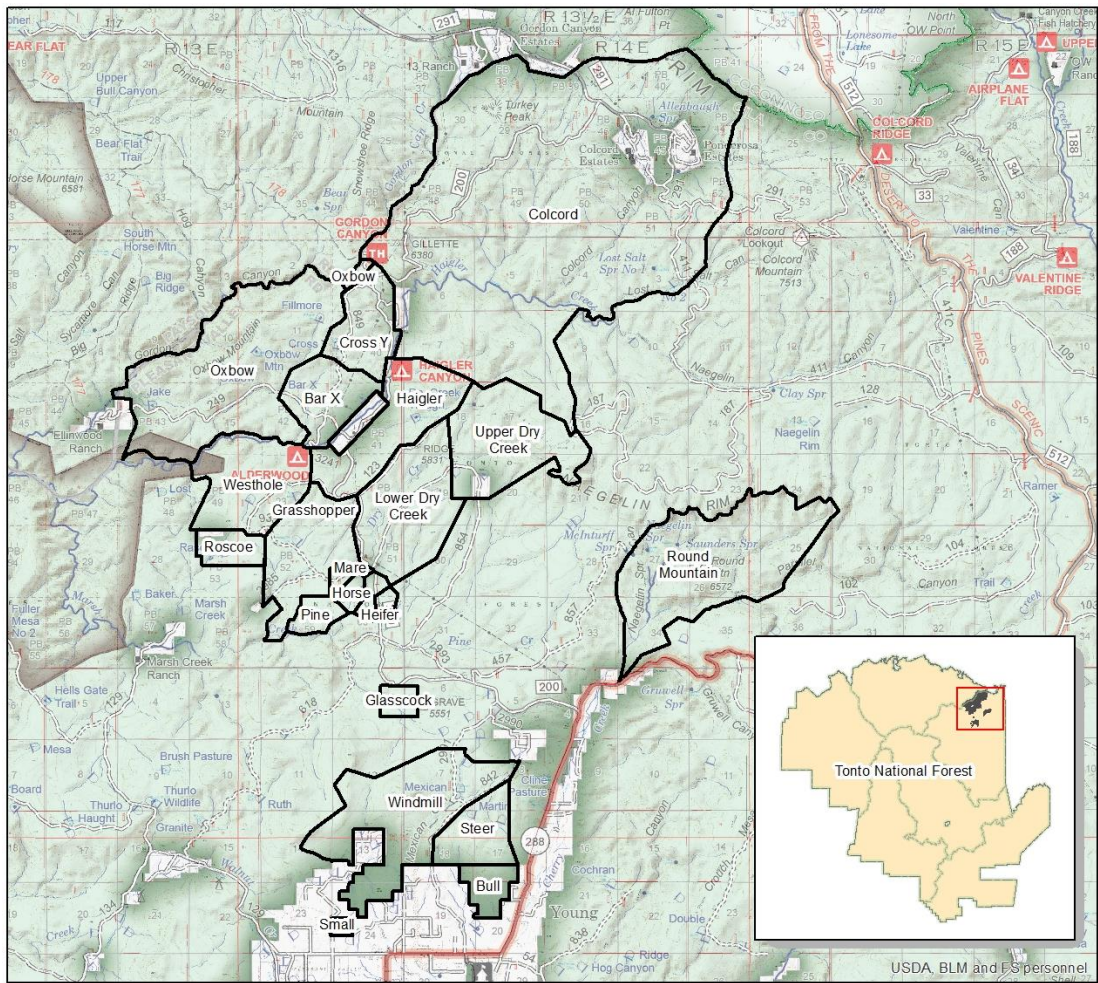


Figure 1: Map of Bar X with Pastures

Heber-Reno Sheep Driveway

The Heber-Reno Sheep Driveway bisects the Pleasant Valley Ranger District diagonally from northeast to southwest, running just north of Young before ending on the Apache Sitgreaves National Forest (Figure 2). The **Driveway** is located over approximately 26 linear miles and on 33,780 acres of the District, and it borders eleven different active cattle grazing allotments, on the Tonto National Forest. It is divided into eight pastures, ranging in size from 630 acres to 6,990 acres.

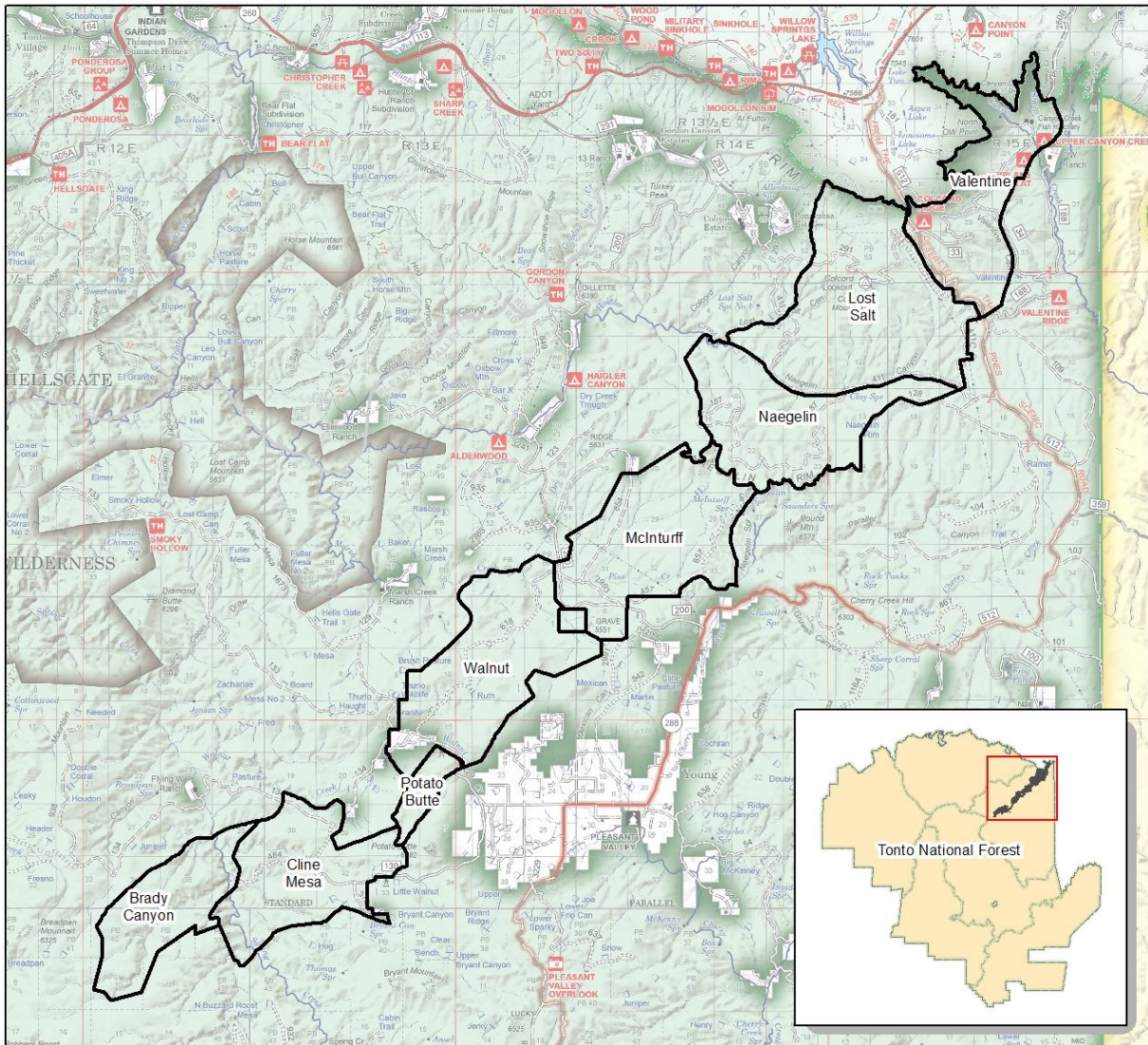


Figure 2: Map of the Driveway with Pastures

Both Bar X and the Driveway have similar topography composed mostly of gently rolling slopes intersected by several minor drainages and canyons, while the remainder is steep and rocky. Canyons along Haigler Creek, Spring Creek, the Naegelin Rim, and beneath the Mogollon Rim are very steep slopes with rocky bluffs and outcroppings with little vegetation. Elevations range from around 4,000 feet in the canyon of Spring Creek to 7,600 feet at the lip of the Mogollon Rim. The mean annual precipitation for the area is 22 inches.

Management History

Bar X

Bar X, Colcord Canyon, Haigler Creek, and Young grazing allotments have been run as a single operation under one term grazing permit since 1973.

Livestock numbers have slowly increased, but averaged 3,707¹ animal unit months (AUMs) per year, between 2007 and 2018 on the allotment. This range falls within carrying capacity estimates based on acreage and estimated forage production (Holecheck, 2011).

The most recent allotment management plan (AMP) is from 1981 and excludes grazing in Colcord Canyon allotment and Turkey Peak pasture (the area labeled Colcord Pasture in Fig. 1) due to potential effects from grazing on resources. Although the intention was to continue monitoring the grazing viability of these areas at that time, this did not occur, and no administrative decision was ever made to reassess these areas for livestock use. During the 2015 and 2018 grazing season, cattle were authorized to use these areas on a trial basis so data could be gathered for *National Environmental Policy Act* (NEPA) analysis of the proposed grazing authorization to determine if there were negative effects to the other resources

Heber-Reno Sheep Driveway

The Heber-Reno Sheep Driveway has been used to move sheep to and from winter grazing grounds to summer pastures on the Apache-Sitgreaves National Forest above the Mogollon Rim since the late 1890s. This use began before the establishment of National Forests.

The Driveway spans across the Mesa, Tonto Basin, and Pleasant Valley Ranger Districts of the Tonto National Forest. In the Mesa and Tonto Basin Districts, the Driveway is a permitted area for sheep which overlays cattle grazing allotments, allowing use from both types of livestock. In the Pleasant Valley District, the Driveway once overlaid cattle grazing allotments as well; however, it is currently a distinct fenced in area, apart from the adjacent allotments.

In 1963, a district-scale vegetation rehabilitation project began on the Driveway that involved reseeding, terracing, and juniper control work. At that time, the Forest Service fenced large portions of the Driveway to be segregated from the adjoining allotments. A letter from the Forest Supervisor from 1964² reinforces the intention of the Forest Service not to permanently close the Driveway. The intent was to provide temporary cattle control during the rehab work. However, administrative action of authorizing permittees back onto the driveway did not occur and the fencing still remains.

Based on monitoring³, the Driveway has been determined to have excess forage that could be used by cattle. In 2010, the permittee for the Bar X was given permission to return to grazing portions of the Driveway historically granted to that allotment. In addition, the permittee was allowed to increase their

¹ Equivalent to 234 cow/calf pairs.

² This letter can be found in the project record

³ See the Vegetation section of the Existing Conditions part of this document for additional information.

authorized numbers above permitted numbers because of the additional acreage. This carrying capacity was evaluated using a “stock and monitor” approach rotations. This involved measuring the effects of stocking levels over time to see if changes in stocking and/or management were needed (Forest Service Handbook 2209.13 Chapter 90). In 2011, the neighboring Soldier Camp allotment followed suit and was given permission to graze portions of the Driveway they had once used, along with an increase in their authorized numbers.

The Decision Notice and Finding of No Significant Impact (DN/FONSI) for the Heber-Reno Sheep Driveway, signed in February 2011, continued to authorize the use of the Driveway for sheep. Additionally, it authorized one pasture on the Driveway that is part of the Potato Butte allotment for both sheep and cattle use.

In 2018, the permittees for both the Soldier Camp and the Bar X allotments were informed they would no longer be authorized to use the Driveway areas and future use would be determined when a NEPA analysis is completed.

Table 1 lists the eight pastures on the Driveway and the cattle grazing allotment which they were historically used by.

Table 1: Historic Use of Driveway Pastures

Driveway Pasture	Historic Allotment Use
Valentine	OW
Lost Salt Naegelin McInturff Walnut	Bar X
Potato Butte	Potato Butte
Cline Mesa Brady Canyon	Soldier Camp

Current Grazing Management

Bar X

The Bar X permittee incorporates a rotational grazing strategy to allow rest on grazed plants. Grazed pastures are rested the following year allowing for up to 24 months of non-use before being grazed again. Typically cattle graze the north end of Bar X in the summer time, and the south end in the winter. Pastures within the Bar X allotments typically do not have specific dates that they must be used. However, there are some resource-specific mitigations that limit their use. In 2008, the Tonto National Forest received a letter of concurrence from U.S. Fish & Wildlife Service after completing a Biological Assessment (BA) titled *Informal Ongoing Grazing Consultation for 33 Allotments*. According to the proposed action listed in the BA, livestock were excluded from grazing the Turkey peak, Colcord Canyon, or Lost Salt pastures due to the presence of Mexican Spotted Owl protected activity centers (PACs).

Cattle were permitted to graze the Round Mountain pasture, which contains a portion of a PAC, during non-breeding season (September through February).

Monitoring during the grazing year focuses on grazing intensity and utilization, which is estimated by evaluating the amount of a grazed plant remaining while considering plant vigor, current annual precipitation, and the growth stage of key species. Utilization is limited to 30 to 40 percent for upland grasses, 50 percent for desirable browse species, 50 percent for woody riparian species, and 50 percent for herbaceous riparian species. Every year annual operating instructions (AOI) are developed in coordination with the permittee, which determine the time of year and duration of use that pastures will be grazed and ungrazed throughout the upcoming year.

Unfenced private property exists within the allotment boundaries, causing some contention. Arizona is an open range state which has enacted laws making it the responsibility of private landowners and private communities to construct a lawful fence to keep out cattle (*ARS Title 3, Chapter 11, Article 8*). This means that, according to state law, it is not the responsibility of the grazing permittee nor federal agency to keep cattle off private lands.

Heber-Reno Sheep Driveway

Based on the 2011 decision, up to 8,000 sheep are permitted to graze the Driveway as they trail through on their way to the Apache-Sitgreaves National Forest. Use may occur two times per year, in spring and late summer. In the past decade, the permittee for the Driveway has sought authorization to use the Driveway four times and at significantly lower number of sheep than permitted. More commonly, the permittee has opted to truck sheep to summer grazing allotments, rather than herd them across the Driveway.

Since 2010, when cattle were authorized to start using portions of the Driveway again, cattle permittees were responsible for coordinating with sheep permittees to determine if they would be using the Driveway during a grazing season. Sheep have been given first priority for forage utilization on the Driveway, with excess forage available to cattle until utilization limits are reached. Competition between the two animals using the driveway has not been observed as sheep tend to utilize more browse and cattle graze on grass.

Existing Range Improvements

Range improvements on the Bar X have been added over time as permitted by regulations. As improvements were constructed, maintenance responsibility was added to the term grazing permit. Improvements have been added to areas of the Driveway as well, with maintenance responsibility being assigned to the corresponding allotment permittee responsible for their initial construction.

The current status of improvements vary and are evaluated depending on various factors: accessibility, water production, and changed management strategies. The Forest Service requires all improvements listed in the Term Grazing Permit to be maintained to standards agreed upon by the permittee and the Forest Service through a permit modification or Annual Operating Instructions. Improvements on Forest Service lands are property of United States Government.

Existing and Desired Conditions

Existing conditions describe the current management situation and environmental conditions within the project area. Desired conditions describe how the resource should function after the project is implemented and are defined by 1985 Tonto National Forest Land Management and Resource Plan (Forest Plan) Standards and guidelines and the best available scientific information.

The Forest Plan identifies management prescriptions and management emphasis for particular management areas across the Tonto National Forest. Bar X is within Management Areas 5G, 5D, and 5B and the Driveway is within Management Areas 5G and 5D (Forest Service 1985).

Management Area 5G is the General Management Area for the Pleasant Valley Ranger District. This area emphasizes “managing for a variety of renewable natural resources with primary emphasis on wildlife habitat improvement, livestock forage production, and dispersed recreation. Watersheds will be managed so as to improve them to a satisfactory or better condition. Improve and manage the included riparian areas (as defined by Forest Service Manual (FSM) 2526) to benefit riparian dependent resources.” (Forest Plan, page 164)

Management emphasis for area 5D, the Mogollon Rim-Sierra Ancha area, is to “manage for a variety of renewable resource outputs with primary emphasis on intensive, sustained yield timber management, timber resource protection, creation of wildlife habitat diversity, increased populations of emphasis harvest species, and recreation opportunity. Timber harvesting methods and timing will include improvement of wildlife habitat quality and watershed condition, and will consider impacts on intensive range and recreation management. Mining activities are authorized in conformance with existing laws and regulations. Visual quality protection will be emphasized in the area (analysis area 5542) of the Highline Trail, a National Recreation Trail” (Forest Plan, page 151).

Management Area 5B encompasses the Hellsgate Wilderness. The primary emphasis for this area is to “manage for wilderness values, wildlife habitats and natural ecological processes while allowing livestock grazing and recreation opportunities that are compatible with maintaining these values and processes.” (Forest Plan, page 147)

Resources chosen to illustrate the existing and desired condition for this project are indicators of range management: vegetation, soils, riparian, water quality, and watershed conditions. For resource managers to determine if a project is maintaining or moving toward its desired condition, the resource’s condition must be measurable over time.

Vegetation

Existing Conditions

Both the Bar X and the Driveway share similar vegetative conditions. The higher elevations in the northern portion of the project area is ponderosa pine (*Pinus ponderosa*) vegetative community which includes an understory of alligator juniper (*Juniperus deppeana*), scrub oaks (*Quercus* spp.), manzanita (*Arctostaphylos* spp.), and perennial grasses. Moving south, the landscape changes to be primarily

pinyon-juniper woodland and juniper grassland. Understories are composed of species such as shrubby buckwheat (*Eriogonum wrightii*), grama (*Bouteloua* spp.) and threeawn (*Aristida* spp.) grasses, and some encroachment by prickly pear.

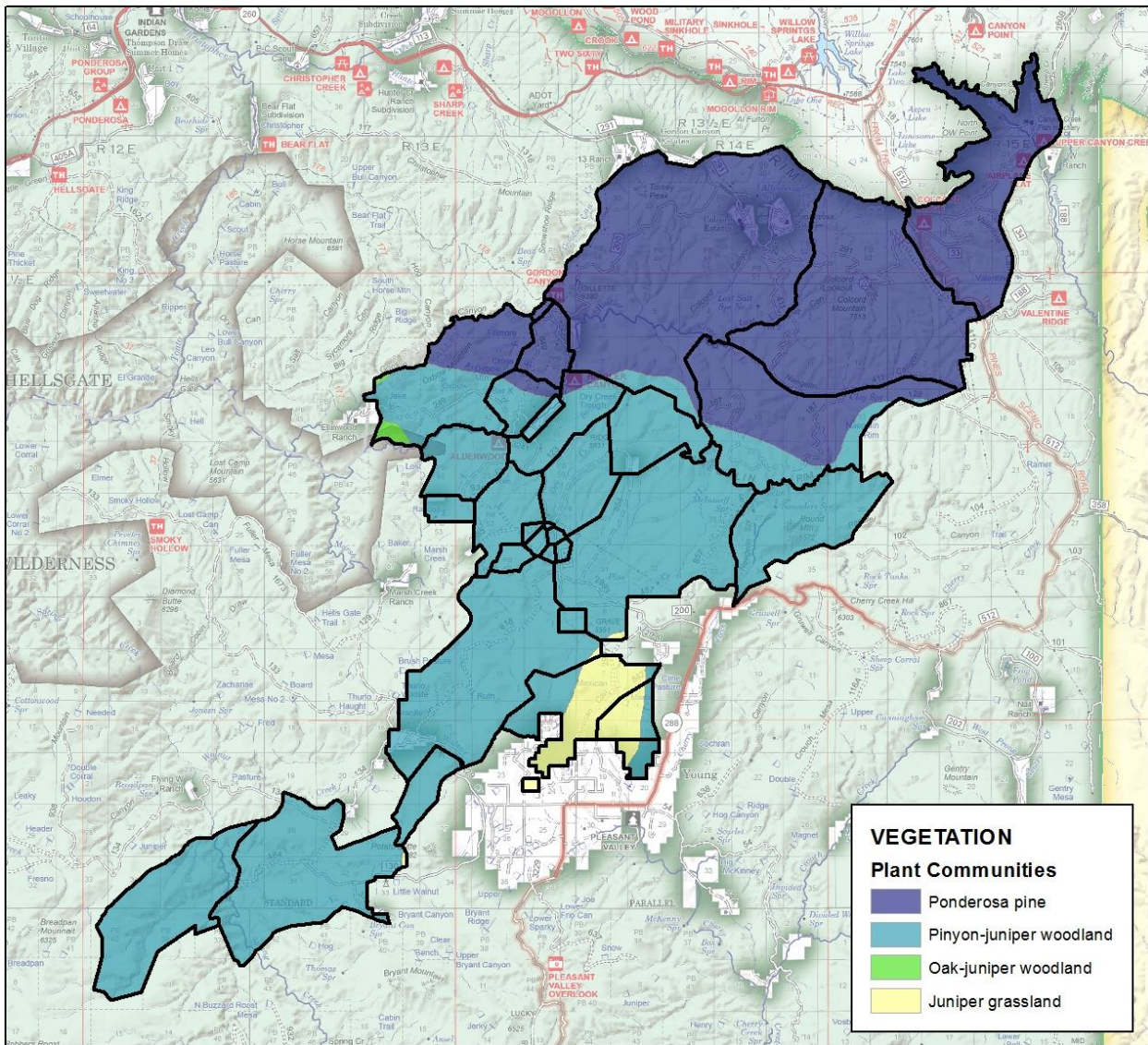


Figure 3: Vegetation Communities on Bar X & the Driveway

Figure 3 shows a map of broad vegetation groups for Bar X and the Driveway. These are groupings of climax plant communities designated by characteristic and diagnostic plants that distinguish one plant community from another (Brown 1994). There may be a large degree of variability within these vegetation groups. The vegetative types were developed from aerial photo interpretation, satellite imagery, and on-the-ground observations. Not all types and delineations were field validated.

Monitoring

The Tonto National Forest utilized “Reading the Range” monitoring protocol which involved gathering data on herbaceous and half shrub vegetative cover, utilization monitoring, forage production,

frequency, browse monitoring, onsite precipitation data, and characterization of soils. The intent of this data is to assist rangeland managers in making timely decisions relative to livestock management. Long term vegetative trend can be extrapolated from these data into the future. Protocols for Reading the Range were established collaboratively between the United States Department of Agriculture's Forest Service and Natural Resource Conservation Service, University of Arizona, University of Arizona's Gila County Cooperative Extension, and local livestock ranchers.

In 2007, eight key areas were established across Bar X as Reading the Range monitoring sites. By 2014, 12 sites had been established. In addition, four sites are located on the Driveway established between 2007 and 2014. These key areas are defined as a relatively small portion of a rangeland selected because of its location, use, or grazing value as a monitoring reference point for grazing use (Holecheck, J.L., et al. 2012). Key areas are intended to be within a single ecological site or plant community, responsive to management actions, and indicative of the ecological site or plant community they are intended to represent (ITT 1996).

Monitoring of these 16 sites show that ground cover types have remained stable throughout⁴. Distance between perennial plants is also measured as a reflection of ground cover and plant distribution. This measurement is called "fetch" and is a value used when discussing soil erosion potential. Trends show only minor fluctuations in fetch, most likely due to climate variability and potential for perennial regrowth. Data is available from the District office.

Production Utilization

Production utilization studies are conducted as a snapshot in time of an area's carrying capacity. They measure how much herbaceous forage is available in a given key area compared to how much is being consumed by cattle.

Production and utilization data has been gathered at key area monitoring sites at the same time Reading the Range was taking place. Generally, utilization has only been slight (one to 20 percent) to light (21 to 40 percent) with infrequent instances of moderate (41 to 60 percent) use. As a result, it was the assessment of the University of Arizona's Gila County Cooperative Extension that "conservative grazing management is being applied, as outlined in the multi-agency document *Principals of Obtaining and Interpreting Utilization Data on Southwest Rangelands*" (Smith et al. 2005, Revised 2016).

Average herbaceous forage production was between 258 and 945 lbs. per acre across the sixteen key areas. This data, along with distance to water, slope, and percent of allowable forage use were used to help evaluate carrying capacity.

Desired Conditions

Desired conditions for the analysis area are based on Forest Plan guidance, site-specific knowledge of the allotments, and current scientific information related to the project area. In general, desired condition for the allotments based on the actions associated with grazing management are to maintain

⁴ Slight fluctuations in ground cover may be due to small variations in the transect lines from year to year.

or improve soil and water quality, when possible, augment water supplies when compatible with other resources, and enhance riparian ecosystems, when possible, by improved management.

Table 2: Specific Desired Conditions for Bar X and the Driveway

Forest Direction for Domestic Livestock Grazing	Specific Desired Condition	How to Measure Desired Condition
Maintain a minimum of 30% effective ground cover for watershed protection and forage production, especially in primary wildlife forage producing areas. Where less than 30% exists, it will be the management goal to obtain a minimum of 30% effective ground cover.	Maintain or improve litter and vigor through both short term and long term monitoring in key areas. Grazing would be managed so Allowable Use thresholds are not exceeded, at minimum, during a pasture's grazing period.	Utilize short and long term monitoring protocol to capture native plant ground cover, vigor, litter, and herbaceous perennial grass utilization. Monitoring should yield a stable to upward trend.
Maintain and restore riparian ecosystems. Management strategies should move degraded riparian vegetation toward good condition as soon as possible. Damage to riparian vegetation, streambanks, and channels should be prevented.	Limit browse to 50% of leaders on upper 1/3 of plants up to 6 feet tall, 40% utilization of plant species biomass for Deergrass (<i>Muhlenbergia rigens</i>), maintain 6-8 inches of stubble height for emergent species such as rushes, sedges, cattails, and horsetails.	Riparian utilization would be measured, at minimum, while livestock are in pasture. Excess utilization would result in management changes.
Implement forest plan forage utilization standards and guidelines to maintain owl prey availability. Promote development of owl habitat.	Utilization in Mexican Spotted Owl PACs and Northern Goshawk habitats would optimally be at 20% (with a maximum of 40%)	Upland utilization would be measured in PACs. Excess utilization would result in management changes.
Maintain potential for beneficial fire while inhibiting potential destructive fire.	Utilization on woody species would not exceed 50% on current year's growth.	Upland utilization would be measured. Excess utilization would result in management changes.
Strive to attain good to excellent range conditions.	Maintain a conservative grazing intensity which results in 30-40% utilization on herbaceous plants at the end of the growing season.	Utilize short and long term monitoring protocol to capture native plant ground cover, vigor, litter, and herbaceous perennial grass utilization. Monitoring should yield a stable to upward trend.

Overall desired condition for the analysis area is maintenance and/or restoration of sustainable ecosystems with effective grazing management. Effective grazing management involves implementing prescribed grazing strategies that achieve multiple management goals and outcomes.

Soils

Existing Conditions

Soil quality assessment and monitoring (soil condition) is necessary to determine watershed condition and long-term soil productivity (Forest Service Handbook (FSM 2550.2, 2009). Soil condition monitoring is completed during the Terrestrial Ecosystem Unit Inventory (TEUI) mapping process. It is an evaluation of soil quality based on an interpretation of factors which effect vital soil functions. These functions are:

the ability of the soil to hold and release water (hydrologic function), the ability of the soil to resist erosion and degradation (soil stability), and the ability of the soil to accept, hold and release nutrients (nutrient cycling).

Soils are evaluated and assigned a soil condition category, (satisfactory, impaired, or unsatisfactory), which is a reflection of soil function. These categories are defined as:

- Satisfactory – The soil indicators (hydrologic function, soil stability, and nutrient cycling) signify that soil function is being sustained and the soil is functioning properly and normally. The ability of the soil to maintain resource values and sustain outputs is high.
- Impaired – The soil indicators (hydrologic function, soil stability, and nutrient cycling) signify a reduction of soil function. The ability of soil to function properly has been reduced and/or there exists an increased vulnerability to degradation. An impaired category should signal land managers that there is a need to further investigate the ecosystem to determine causes and degrees of decline in soil functions. Changes in management practices or other preventative actions may be appropriate.
- Unsatisfactory - Indicators signify that loss of soil function has occurred. Degradation of vital soil functions result in the inability of soil to maintain resource values, sustain outputs, and recover from impacts. Soils rated in the unsatisfactory category are candidates for improved management practices or restoration designed to recover soil functions.

The tables below show an evaluation of soil condition data collected on the Bar X and Driveway in 2011.

Table 3: Driveway Soil Condition by Acre

Pasture	Satisfactory	Impaired	Impaired - Unsatisfactory	Satisfactory- Impaired	Satisfactory- Unstable	No Condition Assessed	Analyzed	Total
Brady Canyon	No Data	No Data	No Data	No Data	1366	1571	1366	2937
Cline Mesa	No Data	No Data	No Data	No Data	624	3450	624	4074
Lost Salt	5227	336	No Data	No Data	1425	No Data	6988	6988
McInturff	74	No Data	161	21	500	4476	756	5232
Naegelin	3499	40	No Data	178	757	No Data	4474	4474
Potato Butte	No Data	No Data	No Data	No Data	No Data	637	0	637
Valentine	4128	45	No Data	No Data	61	No Data	4234	4234
Walnut	No Data	No Data	No Data	No Data	No Data	5198	0	5198
Total	12928	421	161	199	4733	15332	18442	33774

277 **Table 4: Bar X Soil Condition by Acre**

Pasture	Satisfactory	Impaired	Impaired - Unsatisfactory	Satisfactory - Impaired	Satisfactory - Unstable	No Condition Assessed	Analyzed	Total
Bar X	487		156	No Data	44	No Data	687	687
Colcord	8540	36		No Data	2325	No Data	10901	10901
Cross Y	507		95	No Data	94	No Data	696	696
Glasscock	No Data	No Data	No Data	No Data	No Data	145	0	145
Grasshopper	21		17	No Data	No Data	1070	38	1108
Haigler	54		22	No Data	953	150	1029	1179
Heifer	No Data	No Data	No Data	No Data	No Data	68	0	68
Horse	No Data	No Data	No Data	No Data	No Data	97	0	97
Hospital	No Data	No Data	No Data	No Data	No Data	48	0	48
House	No Data	No Data	No Data	No Data	No Data	60	0	60
Lower Dry Creek	No Data	No Data	No Data	No Data	No Data	1401	0	1401
Mare	No Data	No Data	No Data	No Data	No Data	63	0	63
Oxbow	358	No Data	147	68	1294	1231	1867	3098
Pine	No Data	No Data	No Data	No Data	No Data	196	0	196
Roscoe	No Data	No Data	No Data	No Data	No Data	0	0	0
Round Mountain	314	No Data	94	0	1592	468	2000	2468
Steer	No Data	No Data	No Data	No Data	No Data	582	0	582
Upper Dry Creek	589	No Data	101	No Data	458	289	1148	1437
Westhole	57	No Data	39	No Data	243	843	339	1182
Windmill	No Data	No Data	No Data	No Data	No Data	1774	0	1774
Total	10927	36	671	68	7003	8485	18705	27190

Slope

Slopes of up to 60 percent are considered suitable for livestock grazing. Division of slope classification for livestock utilization analysis is a way of ensuring adequate forage production is available and within reach of livestock. Livestock tend to eat vegetation closer to water sources and on flatter ground first before moving further away from water and up steeper slopes. The Forest Service measures use and production on less steep slopes because steep slopes above 60 percent experience lighter grazing and are not an accurate representation of the pasture (Holechek, 1992 & 2012).

287 **Table 5: Bar X and Driveway Slope**

Pasture	Acres Per Slope Type				Total
	0-20%	21-40%	41-60%	>60%	
Bar X	486	179	20	1.9	686
Brady Canyon	1112	695	650	477.0	2934
Bull	201	68	2	0.1	271
Cline Mesa	1815	1184	695	379.2	4073
Colcord	3859	4870	1644	523.9	10897
Cross Y	301	310	76	8.1	695
Glasscock	122	23	0.03		145
Grasshopper	695	348	61	2.5	1107
Haigler	394	544	213	26.3	1178
Heifer	66	2.28	0	0	68
Horse	97	0.07	0	0	97
Hospital	48	0.05	0	0	48
House	45	13	1	0	59
Lost Salt	2118	3463	1228	179.7	6988
Lower Dry Creek	827	499	72	3.5	1401
Mare	54	9	0	0	63
McInturff	3625	1264	273	71.7	5233
Naegelin	1772	2125	483	92.4	4473
Oxbow	744	1020	710	622.3	3096
Pine	149	36	11	0.0	196
Potato Butte	486	117	28	6.1	637
Roscoe	276	11	1	0.1	288
Round Mountain	548	1046	611	259.5	2464
Small	49	0.2	0	0	49
Steer	377	190	16	0.3	582
Upper Dry Creek	597	490	252	74.2	1412
Valentine	1246	1667	846	467.2	4226
Walnut	2980	1754	390	70.3	5195
Westhole	615	358	107	102.3	1182
Windmill	1372	462	41	3.7	1879
Total	27074	22747	8429	3372.1	61623

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289 *Desired Conditions*

290 Desired conditions for soils are to “maintain or restore soil quality on National Forest System lands (FSM
 291 2550.2, 2009). Manage resource uses and soil resources on NFS lands to sustain ecological processes
 292 and condition so that desired ecosystem services are provided in perpetuity.” Further, the Forest Plan
 293 indicates that projects should improve soil productivity.

294 Ecological land units are assigned a soil condition category which is an indication of the status of soil
 295 functions. Soil condition categories reflect soil disturbances resulting from both planned and unplanned
 296 events. Current management activities provide opportunities to maintain or improve soil functions that
 297 are critical in sustaining soil productivity (FSM 2550.2, 2009).

298 Soil productivity and function, including ability of soil to resist erosion, infiltrate water and recycle
 299 nutrients, should be sustained and functioning properly so terrestrial and riparian ecosystems are more
 300 resilient and better adapted to climate change. Herbaceous vegetation cover should be maintained at
 301 levels that contribute to suitable hydrologic function, soil stability, and nutrient cycling. Diversity of grass

and forb species and presence of plant litter and grass, forb, shrub, and tree basal area surface cover should help reduce occurrences of compaction and erosion.

It would be desirable for all soils within the allotment to be in satisfactory; however, soil improvement may take longer than the anticipated ten years for this authorization. Therefore, the desired condition would be to maintain soils currently in satisfactory condition for soils within the allotment to maintain their current condition and to manage for upward trend of the soils that are in impaired condition within grazing management practices.

Riparian/Stream Channels

Existing Conditions

There are 36 miles of perennial and intermittent stream channels within the Bar X and Driveway allotments that support obligate riparian vegetation. Of this total, 5 miles of perennial and 3.5 miles of intermittent are found on the Bar X and the remaining 12 miles of perennial and 15.5 miles of intermittent are on the Driveway. Obligate riparian vegetation requires reliable access to shallow groundwater supplied either by surface flow or groundwater for its survival. Based on Forest Service reports and associated changes in both upland and riparian vegetation, the extent of riparian vegetation has been reduced from historic conditions (Croxen 1926, Haskett 1935, Heffernan 2008).

Key Reaches

A stream reach is defined as any length of stream between two specified points. Key reaches, similar to upland key areas (Interagency Technical Team 1996), are stream channels/ springs/ riparian areas that are representative, responsive to changes in management, accessible to livestock, and contain key species. Key reaches are synonymous with designated monitoring areas (DMA's) defined by Burton et al. (2011) as the location where monitoring occurs. Table 6 displays key reaches by pasture⁵. The seven riparian areas identified in Table 6 have the potential to improve within a relatively short time period (10 years) or have reached desired condition, and have been identified as key reaches for this analysis.

Table 6: List of key reaches within each allotment and pasture

Allotment	Pasture	Key Reaches
Bar X	Grasshopper	Marsh Creek
	Colcord Canyon	Colcord Canyon
	Colcord Canyon	Allenbaugh Spring
Young	Round Mountain	Cherry Creek
		Saunders Canyon
Driveway	Walnut	Walnut Creek, Marsh Creek

Existing and desired conditions of these key reaches are discussed below, by allotment and pasture. Existing conditions for each stream reach include condition assessment (Mason and Johnson 1999), stream type (Rosgen 1996), and/or monitoring data. In addition, the water sources for each pasture that contains a key reach are described. The availability of alternative, developed water sources within

⁵ Pasture data taken from corporate database (S_R03_TON.rmu_subunit)

a pasture can lessen the amount of time cattle may spend in riparian areas. Many of the water developments have been inventoried and data is available in the appendix Table 1.

Bar X

Grasshopper Pasture

Yearlong water can be found in Marsh creek and in Grasshopper tank, while drainages bisecting the pasture hold water seasonally.

Marsh Creek. Marsh Creek flows approximately 0.2 miles across the south portion of the Grasshopper Pasture. This reach of the creek is very productive, supporting alder, willow, sycamore, and abundant deergrass that is facilitating bank formation. The channel was rated as stable and is a Rosgen "C" type with cobble as the dominant sediment in the channel and on the floodplain. At the west end of the reach, overflow channels create a swampy area that supports sedges and rushes. There is only one other water source in this pasture (Grasshopper Tank).

Colcord Pasture

Several springs and stocktanks are scattered across this pasture. Drainages bisecting the pasture hold water seasonally.

Colcord Canyon. The spring that supplies this reach of Colcord Canyon originates above FR291 on private land. The reach that begins below the road is a stable Rosgen "E" type stream that supports a wet meadow. The channel is narrow and sediment consists of sand with some cobble. The floodplain is covered with sedges, rushes, and horsetail, with an occasional false indigo and pine.

Allenbaugh Spring. The actual spring source is in a very narrow valley (20 feet wide) upstream from the Colcord Road (FR 291). The spring creates a small channel that runs out of the valley into a wide open area to the road for about 100 feet. It is a stable Rosgen "E" type channel, and supports a wetland of thick sedges and rushes.

Round Mountain Pasture

This pasture is watered by Cherry Creek and several springs that discharge to drainages.

Cherry Creek. Cherry Creek originates below the Mogollon Rim and flows approximately 51.7 miles south to its confluence with the Salt River. It flows approximately two miles across this pasture 0.5 miles of which are perennial. The channel is wide with mainly cobble and boulder sediments. It is an impaired Rosgen "B" type due to a high width/depth ratio and excessive sediment. Riparian vegetation is thick and diverse and includes: sycamore, ash, alder, red willow, Goodding's willow, grape, deergrass, and shrubs and forbs. Old channels and the terrace support large sycamores and pine trees.

Saunders Canyon. Saunders Canyon is a small tributary to Cherry Creek that originates on the Naegelin Rim. It is ephemeral, except for a 0.25 reach fed by Saunders Spring that provides a more sustained flow and contains willow/ponderosa pine vegetation type. There is ¼ mile of willow riparian vegetation by the spring.

The Driveway

Walnut Pasture

Water in this pasture can be found in Walnut Creek, three stock tanks and one well.

Walnut Creek. Walnut Creek originates east of Potato Butte and flows generally west to its confluence with Spring Creek. About one half mile of the creek is contained within this pasture. The channel was previously rated as stable, with dominant sediment of gravel and cobble. Photo points taken in this reach also show an increase in the density of herbaceous riparian vegetation.

Marsh Creek. The riparian reach of Marsh Creek in this pasture is just upstream of the fence with the Grasshopper Pasture. The vegetation and channel are the same as the east end of the reach in the Grasshopper Pasture with a Rosgen “C” type channel supporting alder, willow, sycamore, and deergrass.

Desired Conditions

Riparian areas (including streams, seeps, springs, and wetlands) are intact, properly functioning, and resilient to disturbances.

Desired conditions for key reaches include both short-term and long-term timeframes. Short-term desired conditions are to:

- Maintain residual herbaceous vegetation along the greenline or streambank whenever precipitation is expected;
- Re-introduce riparian vegetation if native riparian species are absent;
- Minimize the annual impacts to seedling and sapling riparian woody species; and
- Limit physical impacts to alterable streambanks and greenlines.

Long-term desired conditions are to:

- Optimize riparian tree and shrub establishment, especially following episodic, regional winter storms;
- Increase the density, vertical and horizontal canopy cover of woody riparian tree species;
- Increase the proportion of obligate and facultative riparian species;
- Maintain or increase canopy cover of herbaceous species to at least 50% (or 5% to 25% for reaches now at trace to 1%);
- Decrease the greenline to greenline width;
- Optimize the establishment of floodplains and streambanks; and
- Improve stream channel function and stability.

Water Quality & Quantity

Existing Conditions

The Arizona Department of Environmental Quality (ADEQ) assesses the quality of waters within the state in an integrated assessment report (305(b) report) that describes the status of surface water in the state in relation to state water quality standards and designated uses. The most recent report is the 2016 assessment report (ADEQ, 2018). Four streams within or shortly downstream of the analysis area are

assessed in this report. They include Canyon Creek from its headwaters to the White Mountain Apache Reservation, Cherry Creek beginning just below Young, Gordon Canyon Creek which forms much of the western boundary of the analysis area, and Haigler Creek, from the headwaters to Tonto Creek. Water quality status of these streams is displayed in the table below.

Table 7: Water Quality Status of Streams within or Just Below Analysis Area

Stream Name	Designated Uses ¹	Water Quality Status	Uses attained	Uses inconclusive	Notes
Canyon Creek	DWS FC FBC AGI AGL AWC	Category 2 Attaining some uses	DWS FC FBC AGI AGL	AWC	AWC attainment could not be determined due to reporting limits of dissolved cadmium being too high.
Cherry Creek	FC FBC AGI AGL AWW	Category 2 Attaining some uses	FC AGI AGL	FBC AWW	FBC is inconclusive due to 1 exceedance each of <i>E. coli</i> and lead. AWW and FBC are inconclusive due to 1 phosphorous exceedance. Need more phosphorous, lead, and <i>E.coli</i> samples
Gordon Canyon Creek	FC FBC AGL AWC	Category 3 Inconclusive		All uses	No exceedances but needs collection of core parameters during three seasons.
Haigler Creek	FC FBC AGI AGL AWC (upper) AWW (lower)	Category 2 Attaining some uses	FC AGI AGL AWC AWW	FBC	FBC is inconclusive due to 1 <i>E. coli</i> exceedance. More samples needed

Designated use descriptions:

DWS – Domestic Water Source

FC – Fish Consumption

PBC – Partial Body Contact

FBC – Full Body Contact

AGI – Agricultural Irrigation

AGL – Agricultural Livestock Watering

AWC – Aquatic & Wildlife Coldwater

AWE – Aquatic & Wildlife Ephemeral

AWW – Aquatic & Wildlife Warm water

Designated uses for non-ephemeral, unlisted tributaries above 5000 feet are AWC, FBC and FC.

Designated uses for non-ephemeral, unlisted tributaries below 5000 feet are AWW, FBC and FC.

Designated uses for ephemeral, unlisted tributaries are AWE and PBC (A.A.C. R18-11-105).

Water Quantity

Climate

Climate within the project area is characterized by a bimodal precipitation pattern with about 60 percent occurring as frontal systems in the winter from December to March and about 40 percent occurring as monsoons in the summer from July to September. Summer storms can be more intense than winter storms but are generally of shorter duration and smaller aerial extent.

The nearest climate station to the allotments is Pleasant Valley Ranger Station. The period of record is 1964-2012 and the average annual precipitation is 22.1 inches (NOAA 2018). The data indicates seven of the ten years from 2003-2012 had below average precipitation (NOAA 2018). Data from the Western Regional Climate Center suggests that three of the five years since data collection ended at the Pleasant Valley RS have also been below normal (based on data collected for Climate Division 4 in Arizona which is primarily Gila County) (WRCC, 2018). Standardized Precipitation Index estimates for Pleasant Valley, Arizona indicate the community has been experiencing drought conditions (based on 12 month SPI data) twelve of the eighteen years since 2000. (<https://uaclimateextension.shinyapps.io/SPItool/> accessed 12/2/2018).

Streams, Springs, and Stock Tanks

There are 36 miles of perennial and intermittent streams in the analysis area. Intermittent streams flow part of the year but have shallow water tables year round that support riparian vegetation. Perennial and intermittent streams in the analysis area are listed in the table below.

Table 8: Perennial and Intermittent Stream Length

Stream Name	Perennial Length (miles)	Intermittent Length (miles)
Canyon Creek	1.1	
Cherry Creek	0.6	
Gordon Canyon Creek	1.9	0.2
Haigler Creek	9.3	1.1
Spring Creek	3.1	
Walnut Creek	1.1	
Rock Creek	0.6	
Pine Creek		0.7
Naegelin Canyon		4.9
Saunders Canyon		0.3
Naegelin Spring Canyon		0.2
Marsh Creek		1.0
Bryant Canyon		0.6
Brady Canyon		1.8
Lost Salt Canyon		0.6
Parallel Canyon		0.8
Dry Creek		0.7
Unnamed Creeks		5.0

Based on ADWR water right claims there are approximately 30 springs and 32 stock tanks within the analysis area boundary on National Forest System (NFS) lands.

Desired Conditions

Water quality, including groundwater, meets or exceeds applicable state water quality standards, fully supports designated beneficial uses, meets the ecological needs of native aquatic and riparian associated plant and animal species, and meets the needs of downstream water users.

Streambeds contain less than 30 percent fines (e.g., sand, silt, clay) in riffle habitat (a rocky or shallow part of a stream or river with rough water) in cold water streams and less than 50 percent fines reach wide (generally a ¼ mile) in warm water streams for aquatic species.

Surface waters provide habitat for aquatic species and riparian species, contribute to connectivity for wildlife across the landscape, provide for local and urban potable water supplies, agricultural uses (e.g., livestock watering and irrigation), and recreation.

Watersheds

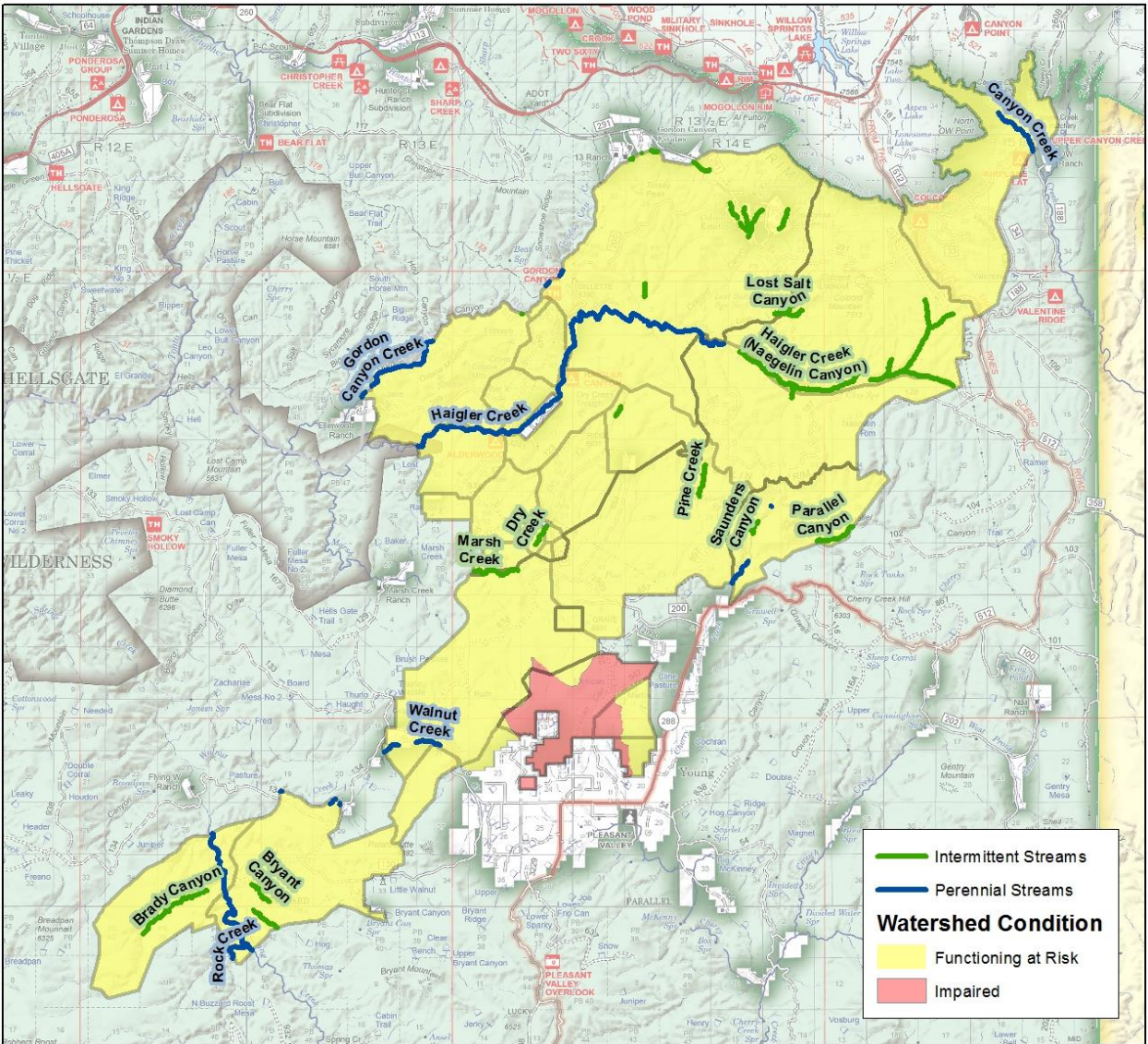
Existing Conditions

In 2010, a national effort was completed by the Forest Service to assess the condition of all 6th code⁶ watersheds on National Forest System land (Potyondy and Geier, 2011). Figure 4 shows a map of all 6th code watersheds within the project area.

Twelve indicators were assessed including: water quality, water quantity, aquatic habitat, aquatic biota, riparian vegetation, road and trail network, soil, fire regime or wildfire effects, rangeland vegetation, terrestrial invasive species, forest cover, and forest health. From one to four attributes are assessed under each indicator. Each indicator is identified as either Functioning, Functioning at risk, or Impaired. Each 6th code watershed was given an overall rating of either Functioning, Functioning at risk, or Impaired based on attribute and indicator scores. Eleven 6th code watersheds lie at least partially within Bar X allotment and the Driveway and results of the assessment for these 6th code watersheds are listed in Table 3. The Haigler Creek sub-watershed has the greatest proportion of the project area within a 6th code watershed.

⁶ Sixth code are the smallest in the hierarchy of watershed classifications. These sub-watersheds and are typically 10,000-40,000 acres in size.

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466 Figure 4: Bar X and Driveway Watershed Condition Class with Perennial and Intermittent Streams

467

468 Table 9: Sixth Code Watersheds within the Project Area

Name	Acres within Project Area	Percent of Total Project Area	Condition
Haigler Creek	22,989	37	Functioning at Risk
Marsh Creek	13,930	23	Functioning at Risk
Middle Spring Creek	6,480	10	Functioning at Risk
Gruwell Canyon – Cherry Creek	4,713	8	Functioning at Risk
Canyon Creek Headwaters	4,005	6	Functioning at Risk
Gordon Canyon	3,894	6	Functioning at Risk
Walnut Creek	3,293	5	Functioning at Risk

Pleasant Valley	2,075	3	Impaired Function
Parallel Canyon – Cherry Creek	338	1	Functioning at Risk
Rock Creek	70	0	Functioning at Risk
Upper Spring Creek	59	0	Functioning at Risk

Attributes most frequently assessed that contribute to watershed condition ratings of other than properly functioning include: road maintenance, aquatic invasive species, riparian vegetation condition, road density and proximity to water, soil condition, and loss of forest cover.

Desired Conditions

In accordance with the Forest Plan, the Tonto National Forest should manage watersheds in a manner aimed at improving them to a satisfactory or better condition. As the Watershed Condition Framework is currently the Forest Service's accepted measure of watershed condition, satisfactory equates to a rating of "functioning properly."

Watersheds should support multiple uses (e.g., grazing, recreation) with no long-term decline in ecological conditions and provide high-quality water for downstream communities dependent on them.

Watersheds should function properly (based on criteria provided in the Watershed Condition Framework or similar current protocol) and exhibit high geomorphic, hydrologic, and biotic integrity relative to their potential condition. They should support the magnitude, frequency, timing and duration of runoff within a natural range of variability and maintain the movement of water and sediment from the surrounding uplands through the channel system in a manner that sustains the health and function of the channel and riparian corridors. Ecological components of the watershed (e.g., soil, vegetation, and fauna) should be resilient to human activities and natural disturbances and maintain or improve water quality and riparian and aquatic species habitat.

Purpose Of and Need for Action

Bar X and the Driveway are a priority for completing grazing allotment planning in conformance with the requirements of the *National Environmental Policy Act* and the *Endangered Species Act* on the Pleasant Valley Ranger District. Completing this effort on time and to standard is essential not only for the Forest Service's regulatory compliance, but for the current allotment permittee's success and productivity. The Forest Plan identifies both Bar X and Driveway as suitable for domestic livestock. The purpose of this action is to consider livestock grazing opportunities on public lands where consistent with management objectives. In addition, per FSH 2209.13, Chapter 90, section 92.22, the purpose of this action is to authorize livestock grazing in a manner consistent with direction to move ecosystems towards their desired conditions.

Authorization is needed on this allotment because:

- Where consistent with other multiple use goals and objectives, there is Congressional intent to allow grazing on suitable lands (*Multiple Use Sustained Yield Act of 1960, Wilderness Act of 1964, Forest and Rangeland Renewable Resources Planning Act of 1974, Federal Land Policy and Management Act of 1976, National Forest Management Act of 1976*).

- This allotment contains lands identified as suitable for domestic livestock grazing in the Forest Plan, and continued domestic livestock grazing is consistent with its goals, objectives, standards, and guidelines (Forest Plan, pages 24, 91-118).
- It is Forest Service policy to make forage available to qualified livestock operators from lands suitable for grazing consistent with land management plans (FSM 2203.1; 36 CFR 222.2 (c)).

It is Forest Service policy to continue contributions to the economic and social well-being of people by providing opportunities for economic diversity and by promoting stability for communities that depend on range resources for their livelihood. (FSM 2202.1).

Chapter 2: Alternatives, Including the Proposed Action

No Grazing – Alternative A

Under this alternative term grazing permits on all Bar X Grazing allotments within the project area would be cancelled, reducing permitted AUM's to zero in the allotments for a period no less than 10 years, following guidance in 36 CFR 222.4 and Forest Service Manual (FSM) 2231.62. Existing improvements no longer functional or needed for other purposes, including interior fences, cattle guards, and water developments would be evaluated for continued usefulness and removed as necessary. Exterior allotment boundary fences would be assigned to neighboring permittees for maintenance. Continued maintenance of existing water developments may be adversely affected.

The Driveway not be authorized for use by cattle. It would still be used as a sheep driveway, allowing up to 8,000 sheep to graze the Driveway bi-annually as they trail through on their way to the Apache-Sitgreaves National Forest. Existing improvements may still be maintained as needed, however as trucking has been used in lieu of the Driveway in recent years past, it is likely improvements will not be maintained. Continued maintenance of existing water developments may be adversely affected.

Under Chapter 90 regulations, a "No Grazing" alternative must be considered in any Range NEPA analysis.

Proposed Action – Alternative B

The proposed action consists of four components: authorization, improvements, conservation measures, and monitoring. The proposed action follows current guidance from Forest Service Handbook 2209.13, Chapter 90 (Grazing Permit Administration; Rangeland Management Decision making).

Authorization

The Pleasant Valley Ranger District of the Tonto National Forest proposes to continue to authorize livestock grazing on Bar X under updated terms and conditions. In addition, cattle would be authorized to graze in the Heber-Reno Sheep Driveway.

Historically, the Driveway was also grazed by cattle and was a part of adjacent allotments (including Bar X). Allotments neighboring the driveway, (who historically used portions of the driveway), would be authorized to incorporate them into their grazing operation. Sheep would continue to have priority use and additional capacity in the driveway would be granted to adjacent allotments. The Driveway would be subdivided into eight pastures that will be available for use by adjacent allotments that historically grazed cattle on it. The adjacent allotments include Bar X, Soldier Camp, Potato Butte, and OW allotments.

Bar X

Proposed yearly maximum authorized use would vary between 4,002- 9,250 Animal Unit months (AUMS⁷) adult cattle year-long. This includes the use of the Driveway. Actual authorized numbers would vary annually based on current resource conditions. Adult cattle may include cows with calves, non-lactating cows, or bulls. Additionally, up to 160 weaned calves (498 AUMS) up to 18 months of age (yearlings) would be authorized from January 1st through May 15th annually. Yearlings are the progeny of existing cattle on the allotment.

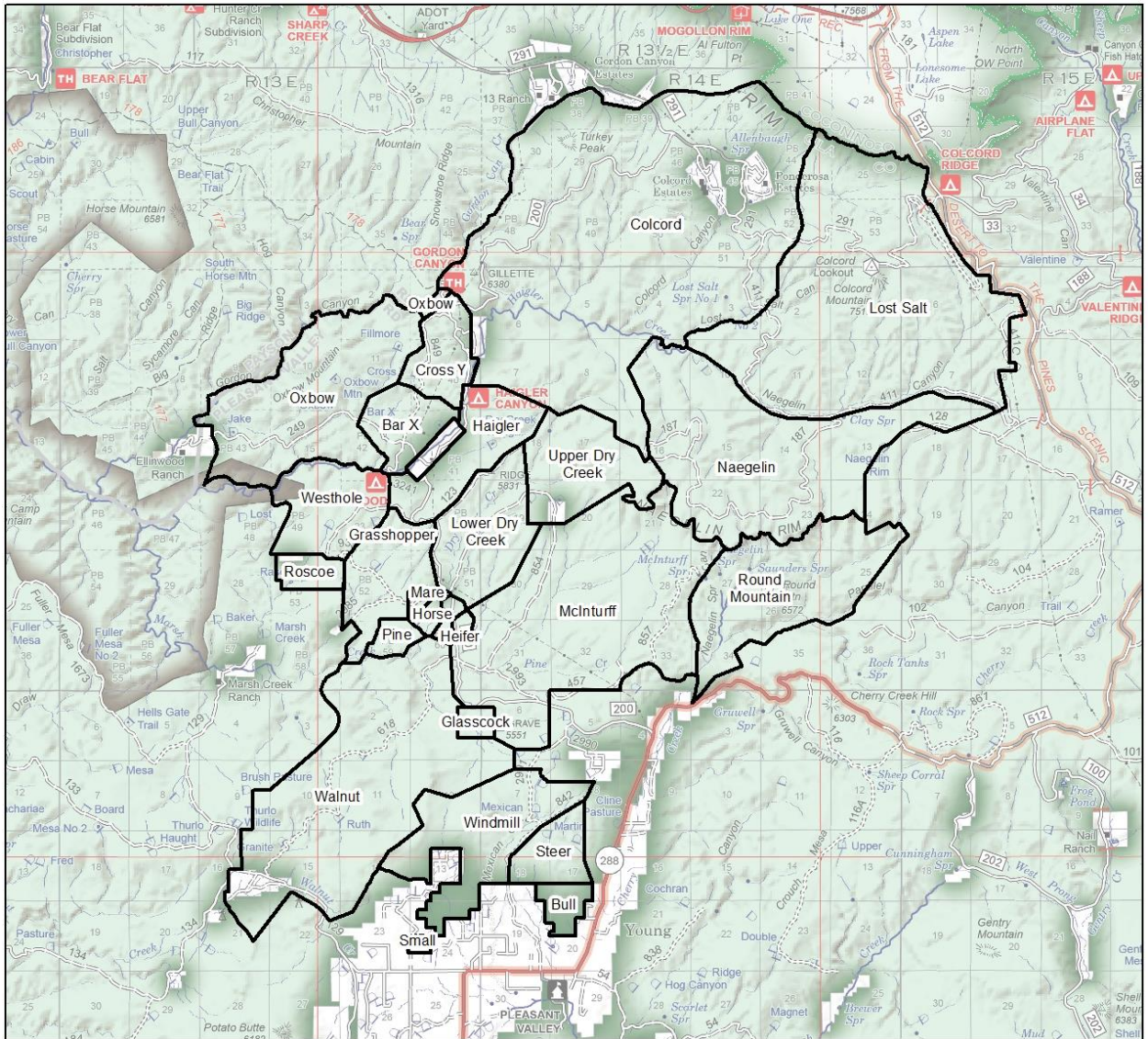


Figure 5: Bar X with its Driveway Pastures

⁷ The amount of forage needed by an “animal unit” (AU) grazing for one month. The quantity of forage needed, based on the cow’s weight, and the animal unit is defined as one mature 1,000 pound cow and her suckling calf. It is assumed that such a cow nursing her calf will consume 26 pounds of dry matter of forage per day. A conversion rate of 3/4 is used to calculate AU’s for yearlings

Table 10: Proposed Permitted Numbers and Season of Use by Allotment

Allotment	Class	Number	AUMs	Season of Use
Bar X	Adult Cattle	239	3,794	3/1-2/28
	Yearlings	67	208	1/1-5/15
Sheep Driveway – Lost Salt, Naegelin, McInturff, and Walnut Pastures	Adult Cattle	313	4,960	3/1-2/28
	Yearlings	93	290	1/1-5/15
		TOTAL	9,250	

Heber-Reno Sheep Driveway

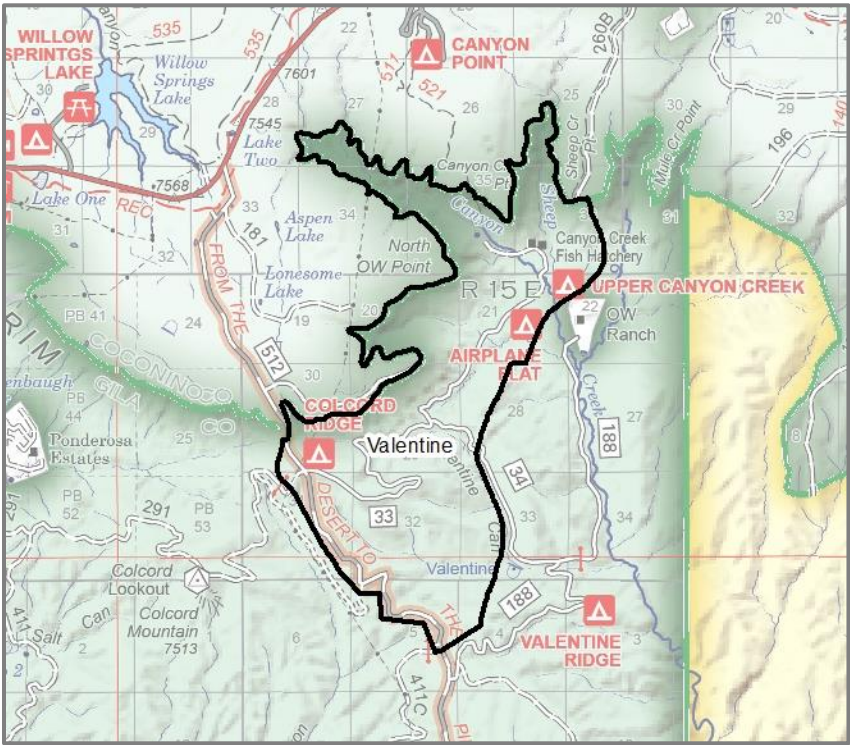
A grazing capacity analysis was completed for the Driveway and the Bar X to help develop the proposed action (Bedson and Sturla, 2018). Additional capacity would be granted to the adjacent allotments as shown below. Time of use and duration in pastures will be determined annually when the Forest Service and permittees meet to develop the annual operating instructions for each allotment.

The Valentine Pasture would be granted to the current OW permittee. Although there are several allotments that border this pasture, the OW allotment has the greatest need for additional pastures. The OW permittee is currently operating with a seasonal permit. The additional pasture would be available for use yearlong if resource conditions allowed, bringing balance to the operation. The other pastures in the OW allotment would remain seasonal but the permittee could potentially run year-long, should conditions allow. Proposed yearly maximum authorized use for Valentine Pasture would be up to 840 AUMs adult cattle year-long.

Table 11: Proposed Permitted Numbers and Season of Use for the OW Allotment

Allotment	Class	Number	AUMs	Season of Use
OW: Sheep Driveway - Valentine Pasture	Adult Cattle	50	840	3/1-2/28

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573
574 **Figure 6: OW's Driveway Pasture**
575

576 The Potato Butte pasture of the Sheep Driveway is currently already authorized for use by cattle (Heber-
577 Reno/ Morgan Mountain Sheep Driveways DN and FONSI, 2011). When this area was last authorized,
578 capacity was not evaluated so this portion was included in the analysis to determine the number of
579 permitted cattle to graze the area. Proposed yearly maximum authorized use would be up to 145 AUM's
580 year-long.

581 **Table 12: Proposed Permitted Numbers and Season of Use for the Potato Butte Allotment**

Allotment	Class	Number	AUMs	Season of Use
Potato Butte: Sheep Driveway	Adult Cattle	9	145	3/1-2/28

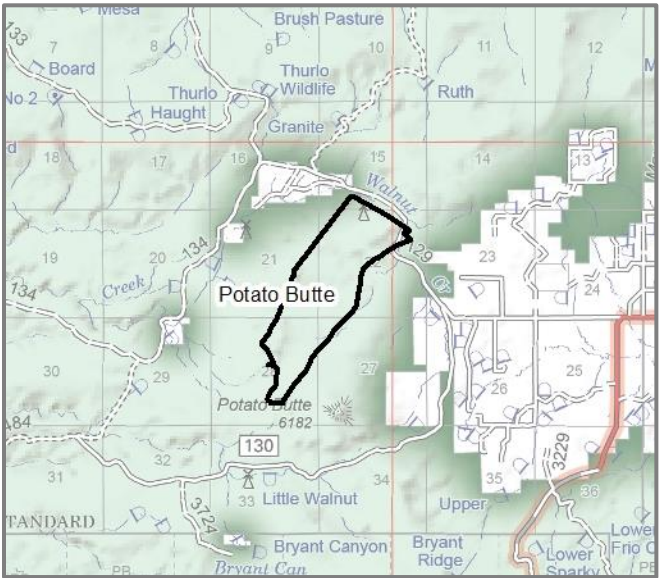


Figure 7: Potato Butte's Driveway Pasture

Cline Mesa and Brady Canyon pastures have historically been a part of the Solider Camp allotment and bisect it. These pastures would be made available to the Solider Camp permittee who has been using and maintaining these pastures in recent years on a trial basis. Proposed yearly maximum authorized use would be up to 1345 (Cline Mesa) and 665 (Brady Canyon) AUM's year-long.

Table 13: Proposed Permitted Numbers and Season of Use for the Soldier Camp Allotment

Allotment	Class	Number	AUMs	Season of Use
Solider Camp : Sheep Driveway Cline Mesa Pasture	Adult Cattle	85	1345	3/1-2/28
Solider Camp: Sheep Driveway Brady Canyon Pasture	Adult Cattle	42	665	3/1-2/28

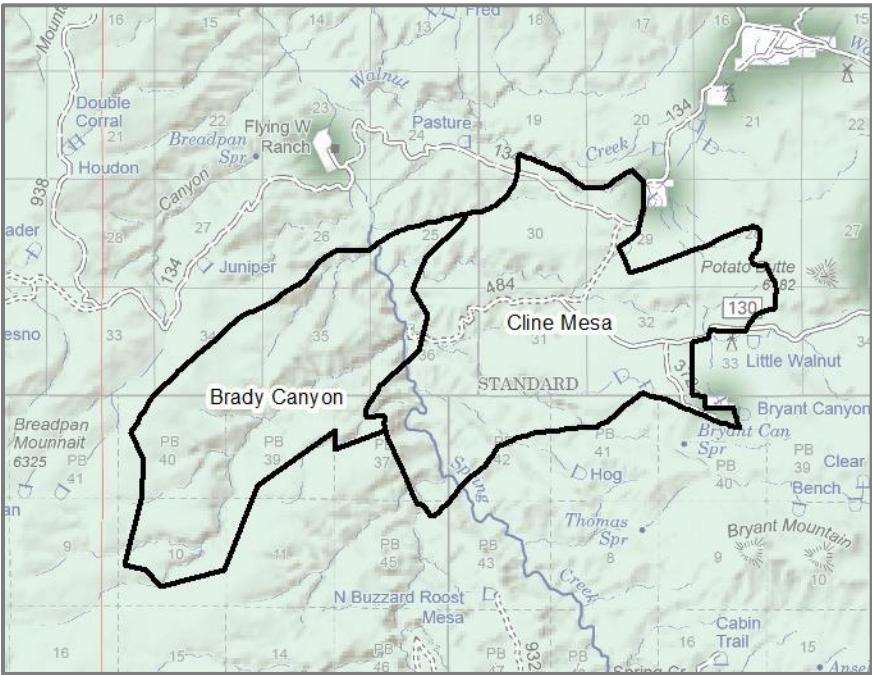


Figure 8: Soldier Camp's Driveway Pastures

Permitted Livestock Numbers: As range improvements are installed, or as conditions on the Driveway allow, authorized numbers may be increased up to the proposed maximum AUM's numbers as listed in Tables 10-13. Annual adjustments would be planned and authorized by the Pleasant Valley District Ranger. Factors affecting annual authorized livestock numbers may include precipitation, pasture rotation, forage production, current range conditions (i.e. forage and growing conditions), water availability, resource monitoring (see monitoring section below) and permittee needs. Further details for annual adjustments are in Administrative Actions below.

Grazing System

Bar X

One adult cattle herd would graze all pastures within the allotment. The Forest Service may authorize the splitting of the herd in response to current resource conditions upon permittee request, to reduce impacts on resources. Additionally a ranch horse/mule herd (up to 20 riding/packing stock used for working the allotment) may be grazed throughout the year in traps and holding pastures. These animals would be counted towards total permitted AUMs.

Heber-Reno Sheep Driveway

Priority use of the Driveway would be given to sheep that are currently permitted to use it. Cattle use on the driveway would not impact the sheep permittee's ability to graze sheep on the Driveway. Forage excess of what is used by the sheep would be considered available for grazing by cattle. The Tonto National Forest and cattle grazing permittees would coordinate with the sheep permittee annually to

determine planned use for the season. Adaptive management would be used to determine the length of time and the time of year cattle would graze within the driveway.

Common to **Bar X** and the **Driveway**: Grazing would occur through a rotational system, either deferred or rest-rotation grazing, which would allow plants the opportunity for growth or regrowth. Pasture use may be deferred in order to accomplish other resource goals related to fire, fuels and habitat in addition to recovery for grazing schedules. While some portions of the allotments are more suitable for winter use and others more for summer, the use of each pasture would vary within the appropriate season over time, in order to prevent the establishment of patterns of repeated use. Animals would be moved to the corresponding allotment once the pasture was grazed. The goal would be to allow for complete deferment of individual pastures, for up to a year, periodically, based on site specific utilization and recovery. All pastures would be available for grazing within the limits of forage availability and appropriate season of use based on current resource conditions.

Annual operating instructions would specify pasture rotation schedules each year and include timing, livestock numbers, and duration. A rotation schedule would be developed with the permittee and incorporated into the allotment management plan to provide an estimate of grazing schedules. This schedule can be altered annually and authorized in the Annual Operating Instructions by the District Ranger.

Vegetation Utilization

Grazing would be managed to achieve long-term goals in pasture key areas and ensure allowable vegetation use thresholds are not exceeded (**Error! Reference source not found.9**).

Table 14: Allowable Vegetation Use Thresholds

Vegetation	Use Threshold
Upland herbaceous	30-40 percent of current year's growth
Upland browse	50 percent of current year's growth
Riparian herbaceous	Limited to 40 percent of plant species biomass and maintain 6 to 8 inches of stubble height of species on emergent such as sedges.
Riparian woody	Limited to 50 percent of leaders browsed on upper one third of plants up to 6 feet tall

Range Improvements

Existing Structural Improvements

Maintenance of existing range improvements on the Bar X and Sheep Driveway would be assigned to the grazing permit holder. Not all current improvements are constructed or maintained to standards. As

improvements are reconstructed, they would be rebuilt to new standards (i.e. wire spacing). Existing improvements would not need to be modified until reconstruction is needed.

Proposed Structural Improvements

Structural range improvements would be constructed in order to facilitate livestock distribution throughout the allotment and assist in achieving the desired conditions and management objectives set forth in this analysis.

It is not necessary for the proposed additional range improvements to be completed in a specific order or timeframe. The following improvements are identified to be installed within the first two years following a decision on this project. These improvements would have heritage resource surveys completed before a decision is signed.

Table 15: Proposed Structural Range Improvements to be implemented within the First Two Years

Description	Allotment	Pasture
Development of roadside or winged stock tanks	Bar X	Colcord, Lost Salt
Installation of a cattle guard	Bar X	Colcord
Corral	Bar X	Colcord
Development of roadside or winged stock tanks	Driveway	Valentine

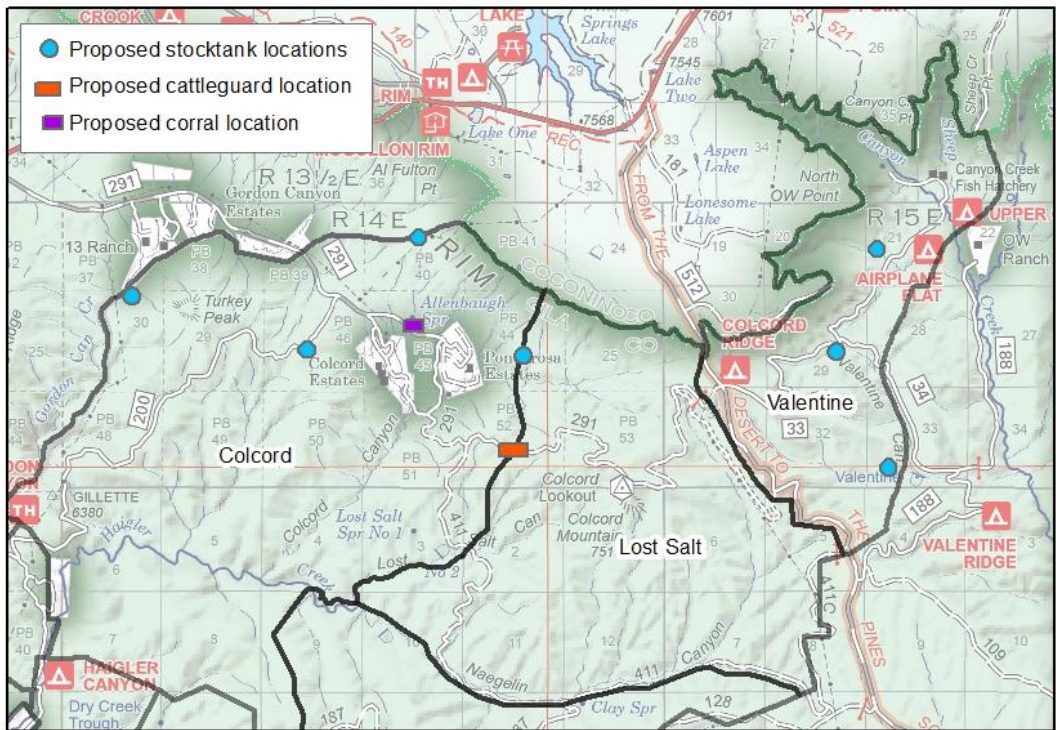


Figure 9: Proposed Improvement Locations

Additional Infrastructure

In addition to the structural range improvements listed above, additional infrastructure may be constructed if needed in the future.

The effects of adding any additional infrastructure such as fencing or waters to achieve resource objectives in the future are disclosed in and tiered to this environmental analysis. Heritage clearances for both the improvement and the access to the improvement would be obtained before implementation of any future improvements. Improvements may be authorized as necessary to achieve desired conditions without additional environmental analysis.

Improvements may be constructed in the future in order to facilitate livestock distribution throughout the allotment and assist in achieving the desired conditions and management objectives set forth in this analysis. Examples of future improvements may include, but are not limited to:

- | | | |
|---------------------------------------|-----|---|
| • Additional pasture division fencing | 675 | • Development of dirt tanks |
| • Holding trap development | 676 | • Development of additional pipelines |
| • Stock drive development | 677 | and troughs |
| • Livestock handling facilities | 678 | • Development of additional trick tanks |
| development | 679 | and catchments |
| • Spring development | 680 | • Cattle guard |
| • Exclosures | 681 | • Wildlife water development |

Improvement Design Features and Specifications

All existing and new improvements would follow Forest Service direction. Much of the design features are taken from the Forest Service Structural Range Improvement Handbook (Forest Service Handbook 2209.22 R3) or other Forest Service policy and Best Management Practices. Additionally, all improvement components (e.g., rusted out troughs, broken sections of pipe, wire etc.) replaced during maintenance or reconstruction would be removed from Forest and properly disposed of.

The effects of adding any additional infrastructure such as fencing or waters to achieve resource objectives in the future are disclosed in and tiered to this environmental analysis. Heritage clearances for both the improvement and the access to the improvement would be obtained before implementation of any future improvements. Improvements may be authorized as necessary to achieve desired conditions without additional environmental analysis within the following specifications

- Motor vehicle and or ATV/UTV access to range improvement sites would be on existing roads where practicable. Off-road vehicle use by pickup, trailer, ATV, UTV, or motorcycle needed to transport materials or machinery to maintain or inspect structural range improvements (fences, corrals, pipelines, wells, windmills, storage tanks, water delivery systems, troughs, earthen tanks) assigned in Part 3 of the term grazing permit as the permit holder's responsibility for maintenance is authorized. Existing routes or the shortest, most direct route to the improvement must be used and new route construction (i.e. blading a path) is not allowed without additional authorization. Cross-country motorized travel is not allowed when conditions are such that cross-country travel would cause unacceptable natural and/or heritage resource damage.

Springs

- All spring source facilities and headboxes should be adequately protected (i.e. buried or encased) or fenced. Headboxes would be constructed of concrete, metal, treated wood or other durable material.
- Horizontal wells must contain a shut off valve and reducer.
- Spring developments would not dewater the spring and must maintain a residual flow for riparian obligate vegetation and wildlife species.

Pipelines

- Diameter of pipe should be large enough to carry the flow of the water development but not less than 1 inch.
- Inlet and outlet pipe are protected by anchoring to trough with a single post next to the vertical pipe and a brace or pole supporting the horizontal pipe. Inlet and outlet pipeline would be buried as much as possible for their protection.
- All above ground pipeline supported structures would be maintained to keep pipe at gradient and prevent sagging.
- Pipelines with air and drain valves would be covered with fine screen to prevent rodents and dirt from entering pipeline. Screens must be replaced as needed.
- Pipeline leaks would be repaired or damaged section would be replaced with materials similar to materials from original construction.
- Pipelines with valve cover boxes would be kept covered and repaired when needed.
- Sufficient water should remain at the spring source to provide for riparian and aquatic resources supported by the spring.
- Riparian and aquatic resources supported by springs may be protected from grazing by fencing.

Troughs and Storage Tanks

- Troughs would be kept at heights that make them useable to livestock. Steel troughs should be kept off of the ground. Troughs which become elevated or uneven from trampling or erosion are periodically backfilled to maintain a useable height, authorization may be needed.
- Troughs and storage tanks should have float valves to maximize the volume of water remaining at the spring source to support aquatic and riparian habitat.
- Excess water in trough would be contained in an overflow pipe at least 50 feet away or nearest drainage. End of overflow pipe must be protected from trampling by livestock.
- New water developments would be constructed in uplands, at least 400 feet away from riparian areas, to encourage livestock use out of the bottoms.
- All existing or future water developments that have open tops (i.e. troughs, open top storage tanks) must have escape and access ramps. All escape ramps would be built of expanded metal or similar materials and extend to bottom of trough and sides. Ramp would be firmly secured to trough rim so it would not be knocked loose by animals. Access ramps would be constructed of durable material such as concrete or metal. Slope would not exceed 45 degrees.

Fences

- All broken wire would be spliced and repaired and re-stretched to keep tension. Wire splices would be made with 12 gauge size tie wire or type of wire used in initial construction.
- Broken or rotted posts, braces or stays would be replaced where needed to maintain wire tension.

- Top wire on all range fences should be kept at 42 inches in height, and bottom wire should be smooth and 16-18 inches above ground. General maintenance would adhere to original construction, unless required by Forest Official. Reconstruction would be to these outlined standards.
- Brush will be maintained clear of fence lines 6' on either side
- Fences crossing system trails will have gates installed.

Gates

- Wire gate tension should be sufficient to prevent gate from sagging and still be easily opened and closed. Gate loops are made of smooth wire, not barbed wire.

Conservation Measures under the Proposed Action

The following conservation measures will be followed when implementing the proposed action. The goal of these measures is to reduce impacts and disturbance to special status species and their habitats.

Riparian

- Equipment or staging areas needed to conduct range management activities (heavy equipment, vehicles, temporary holding pens, etc.) would be outside riparian areas or river/stream corridors and when appropriate, will utilize spill containment systems to minimize impacts.
- Motorized vehicles or heavy equipment used to complete range management activities will not be permitted to cross a perennial stream unless an established road already exists.

General / Improvement Construction and Maintenance

- It will be the permittee's priority to ensure that any livestock observed in unscheduled areas are removed from those areas. If fence repairs are needed, the permittee will complete repairs immediately.
- New watering developments (earthen stock tanks, above ground drinkers, troughs, etc.) would not be developed within 300 ft. of perennial streams.
- New water developments would not disturb or negatively impact Primary Constituent Elements of any species' proposed or designated critical habitat. This also includes selecting areas that require the least amount of vegetation removal, felling or trees or removing downed logs.
- New water developments would not be constructed at any special status species occupied site or protected habitat or constructed during sensitive breeding seasons. If non-nesting is confirmed by the District Wildlife Biologist, these restrictions may be waived on a case by case basis.
- All new or existing above ground water developments will have wildlife ramps to allow for ingress and egress.
- New spring developments would be constructed with the spring box designed so that residual flow is left at spring head to prevent dewatering.
- New fencing would be constructed using a "wildlife friendly" design which includes upper three strands barbed wire, top wire not to exceed 42 inches and lowest strand smooth wire set at 16-18 inches to allow wildlife to safely pass under.
- New water developments across the project area will be monitored twice per year to ensure that bullfrogs do not colonize new areas.

Chiricahua Leopard Frogs

- Permittee will notify USFS Range and Wildlife staff 60 days prior to the maintenance cleaning of any stock tank or drinker occupied by or within dispersal distance of a CLF occupied site.
- Tonto National Forest will continue to collaborate with the Bar X permittee to eliminate nonnative predators at or near Chiricahua leopard frog populations or suitable habitat that pose a threat to those populations, and/or prevent existing sites with suitable Chiricahua leopard frog habitat from becoming occupied by nonnative species.
- Immediately prior to pasture use, the permittee will inspect pasture boundary and livestock enclosure fence lines that are adjacent to areas known to be occupied by Chiricahua leopard frogs. Permittee will ensure that any fence repairs are completed prior to pasture use.
- Permittee will ensure that any livestock that are observed in unscheduled areas associated Chiricahua leopard frog habitat are removed from those areas within 48 hours of their discovery. If fence repairs are needed, complete repairs immediately.
- Permittee will implement measures to reduce the likelihood and extent of transferring chytrid fungus throughout the Bar X Grazing Allotments. This specifically includes taking steps to disinfect or dry equipment and footwear used to clean tanks.
- To minimize livestock trampling and loss of bankline cover, the TNF and permittee will consider methods to protect suitable or occupied frog habitat through the construction of partial fencing (barbed or piperail) and/or construction of trick tanks or double tanks when one tank is fence and the other remains open.

Narrow-headed Gartersnakes

- Permittee will ensure that any livestock that are observed in unscheduled areas associated narrow-headed gartersnake occupied site or critical habitat are removed from those areas within 48 hours of their discovery. If fence repairs are needed, complete repairs immediately.

Mexican Spotted Owl

- Creation of new earthen tanks located within Mexican spotted owl critical habitat will be placed in areas where there will be no negative impacts to Primary Constituent Elements (PCEs). For example, trees or snags greater than 18 inches diameter breast height would not be felled.
- Livestock grazing or livestock management activities will occur within PACs in the project area but the following actions will not be permitted inside of MSO PACs during the breeding season (March 1 – August 31):
 1. the use of mechanized equipment such as chainsaws or electric/gas powered post pounders
 2. operating ATV/UTVs other than on existing roads
 3. use of corrals
 4. maintenance of corrals, buildings, or earthen stock tanks

On a case by case basis, exceptions may occur where above actions 2, 3, and 4 may take place during the breeding season when nesting is confirmed and a nest site is located; this case by case exception does not apply to action 1. Actions 2, 3, and 4 could occur inside a PAC if the action takes place at least one quarter mile away from the known nest site and the District

Wildlife Biologist and USFWS confirm that nesting birds will not be disturbed from noise or human activity.

Bald and Golden Eagles

- The Forest Service will coordinate with USFWS and AGFD to ensure that golden eagle nest location data are updated annually or as new data are collected.
- Range management actions near golden eagle nest trees and/or cliff platforms would be designed to protect eagles from disturbance. Spatial and temporal buffers for the breeding season (January 1st to July 31th) will be determined on a site-specific and annual basis in coordination with USFWS and AGFD.
- New construction or maintenance of fence or water developments will not occur within one mile of an occupied golden eagle nest during the breeding season (January 1st to July 31th) unless the District Wildlife Biologist, AGFD and USFWS determine that disturbance from the action will not cause injury, loss in productivity or cause nest abandonment. These buffers and timing restrictions may be lessened or increased after consulting with AGFD and FWS on a case by case basis.

Monitoring

The objective of monitoring is to determine if management is being properly implemented and if the actions are effective at achieving or moving toward desired conditions.

Effectiveness Monitoring

Effectiveness monitoring includes measurements to track long-term condition and trend of upland and riparian vegetation, soil, and watersheds. Examples of effectiveness monitoring indicators include, but are not limited to pace transects, pace quadrat frequency, dry weight rank, ground cover, Parker 3-step, repeat photography, and Common Non-forested Vegetation Sampling Procedures which measures frequency, fetch, dry-weight rank, production, and utilization. Monitoring would occur at established permanent monitoring points. Both qualitative and quantitative monitoring methods would be used in accordance with the Interagency Technical References (ITR, 1996, revised 1999), Region 3 Rangeland Analysis and Management Training Guide (USDA-FS, 1997), and the Region 3 Allotment Analysis Guide. These data are interpreted to determine if management is achieving desired resource conditions, if changes in resource condition are related to management, and to determine if modifications in management are necessary.

Implementation Monitoring

Implementation monitoring would occur yearly and would include such things as inspection reports, forage utilization measurements in key areas, livestock counts, and facilities inspections. Utilization measurements are made following procedures found in the Interagency Technical Reference (ITR, 1996, revised 1999), or the most current acceptable method, and with consideration of the Principles of Obtaining and Interpreting Utilization Data on Southwest Rangelands. The purpose of implementation monitoring is to determine if grazing meets conservative use guidelines in upland and riparian areas.

Utilization would be monitored on key forage species, which are native perennial grasses or browse species that are palatable to livestock. At a minimum monitoring would include use in key areas, but may include monitoring outside of key areas. The Payson Ranger District range personnel, permittee, and cooperators would be responsible for monitoring livestock grazing utilization. Over time, changes in

resource conditions or management may result in changes in livestock use patterns. As livestock use patterns change, new key areas may be established and existing key areas may be modified or abandoned in cooperation with the permittee and cooperators.

Information would be collected through routine pasture inspections and end of season utilization monitoring. Specific schedules for monitoring would be flexible from year to year based upon resource needs, which could change with climatic variations and management changes. Monitoring for plant cover, vigor, recruitment, and diversity, using techniques described in aforementioned publications, would ensure that wildlife needs and riparian and watershed conditions were moving toward desired conditions.

Monitoring methods could include, but are not limited to, utilization and stubble height monitoring, annual riparian monitoring, and photo point protocols. Data would be used, along with supporting information to determine when livestock must be moved from one pasture to another and to make any necessary adjustments to livestock numbers and/or season of use (determined in AOI).

Key areas are described in “sampling vegetation attributes” (ITR, 1996) as indicator areas that are able to reflect what is happening on a larger area as a result of on-the-ground management actions. A key area should be an area representative of the range as a whole, an area where livestock use occurs, located within a single ecological site and plant community, and be a minimum of 100 yards from fence lines, exclosures, roads, and trails. Key areas may be identified in the allotment management plan.

While monitoring techniques as described above would be conducted in key areas, these would not be the sole locations for gathering information from the grazing allotment to make decisions about the timing, intensity, duration, or frequency of livestock grazing in a given grazing season. The overall condition of the allotment, and such things as distribution patterns or rangeland improvement conditions could be assessed at any given time to help make those decisions.

Riparian Utilization Monitoring

Riparian components in key reaches would be monitored using riparian utilization measurements (implementation monitoring) following methods in *Sampling Vegetation Attributes and Utilization Studies and Residual Measurements* (ITR, 1996, revised 1999) or the most current acceptable method.

In order to achieve Forest Plan Standards and Guidelines the following use guidelines for riparian components are as follows: *obligate riparian tree species* – limit use to less than 50 percent of terminal leaders (top one third of plant) on palatable riparian tree species accessible to livestock (usually less than 6 feet tall); *deergrass* – limit use to less than 40 percent of plant species biomass; *emergent species* (rushes, sedges, cattails, and horsetails) – maintain six to eight inches of stubble height during the grazing period.

The Forest Plan limits use to 20 percent of tree and shrub annual production *by volume*. The percent of leaders browsed was chosen as a surrogate guideline in place of percent volume because volume is an extremely difficult parameter to assess on an annual basis. The method employed for determining the percent of leaders browsed is an expedient and repeatable sampling technique. Mathematical relationships between the number of twigs browsed and percent of current annual growth removed have been established in previous studies (Stickney, 1966).

Utilization limits for herbaceous riparian vegetation are intended to do two things: 1) protect plant vigor and 2) provide physical protection of streambanks or the sediment on the greenline that could develop into a bank feature. Deergrass was selected as the key species to monitor because it is the most common obligate, riparian, native, perennial grass on the Tonto National Forest. Additionally, deergrass exhibits a number of traits that make it an ideal stream-stabilizing plant. The above ground attributes of deergrass aid in preventing soil loss through decreasing flow velocity, they also trap sediment which aids in the rebuilding of stream banks. Furthermore, deergrass is a bunchgrass with an extensive root system which acts to stabilize streambanks (Cornwall, 1998; Clary and Kruse, 2003).

Monitoring short-term indicators, such as stubble height and woody utilization, during the grazing season, can help determine if grazing use criteria is moving riparian conditions toward management objectives over time (Burton, *et al.* 2011). The document, *Principles of Obtaining and Interpreting Utilization Data on Southwest Rangelands* (Smith *et al.*, 2005), would provide guidance for utilization data collection and interpretation.

If utilization reaches limits of recommended allowable use, livestock would be moved from the critical area or pasture considering time of year and extent of area involved. Actual use records in combination with utilization measurements would inform if it may become necessary to minimize or remove access to riparian habitat, if grazing pressure becomes a limiting factor in the use of pastures

Noxious Weed Monitoring

Noxious weeds located in these allotments would be treated as necessary. Permittee and Forest Service would coordinate weed inventory and treatment. Noxious weed monitoring maybe carried out at the same time allotment inspections are conducted. As noxious weed populations are found they would be mapped, monitored, and treated. Treatment of invasive species may be carried out in accordance with practices established in Tonto's Environmental Assessment of Integrated Treatment of Noxious or Invasive Weeds as detailed in that decision notice and finding of no significant impact, pages three and four (Forest Service 2012).

Response to Monitoring

Within the scope of the grazing authorization decision, the Forest may adjust management in response to monitoring data, in combination with other factors such as weather patterns, likelihood of plant regrowth, and previous years' utilization levels. Authorized number of livestock may be adjusted but would not exceed the number authorized in the grazing decision. The grazing decision and associated allotment management plan is implemented through the term grazing permit and annual operating instructions (AOI). Necessary annual adjustments to grazing management on the allotment would be implemented through the AOI, which would adjust use to be consistent with current vegetation productivity and resource conditions. The AOI may change season of use and pasture rest periods, and may also include mitigation measures to avoid or minimize effects to wildlife, soil, and water quality. Modifications to the AOI may be implemented at any time throughout the grazing season in response to current resources conditions or unforeseen environmental concerns such as drought, fire, flood, etc.

Management Practices and Mitigation Measures

Range

Livestock management practices such as herding and salting are critical to achieve proper livestock distribution within each unit/pasture. The permittee would be required to furnish sufficient riders or herders for proper distribution, protection, and management of cattle on the allotment. Tonto National Forest Grazing Practices are as follows:

- Forest Plan Standards and Guidelines applicable to livestock grazing would be followed (Forest Plan, p. 24).
- Salt and/or supplements would be placed where forage is abundant and current grazing use levels are low. Salt and/or supplements would not be placed any closer than one quarter mile from available water, recreation sites, or designated trails except where prior written approval had been obtained from the District Ranger.
- No salting would occur within or adjacent to identified heritage sites. Salt would be removed from pastures when cattle have left an area, and not placed within a pasture until the cattle arrive. Salting locations would be coordinated with the wildlife biologist, range staff and permittee.
- When entering the next scheduled pasture, all livestock would be removed from the previous pasture within two weeks (dependent on terrain).
- Permittee would ensure that enough time is allowed to remove livestock to meet the pasture move date(s) and avoid unauthorized and excess use.

Permittee would ensure all necessary infrastructure for managing livestock are in functioning condition prior to entering the next scheduled pasture.

Administrative Actions to Adjust Grazing Management

There are several types of administrative actions that could be used to modify grazing management within the allotment. If monitoring indicates that desired resource conditions are not being achieved in the desired time frame or in areas of this allotment, there are tools, or administrative actions that would be used to modify livestock management. Although there are many factors which may cause a desired condition to not be met, the following show how livestock management may be modified if livestock grazing is determined to be the probable cause why these desired conditions are not being met. These tables list examples of administrative actions included in this proposed action that may be taken to respond to certain resource conditions.

- Extending or shortening time in a pasture based on utilization levels in uplands and riparian areas
- Assessing the readiness of a pasture and changing its position in the rotation for the season
- Time or season of pasture use
- Resting a pasture for one or more growing seasons
- High intensity, short duration, or other grazing system
- In the event of extended drought, severe fire, or depleted rangelands, complete removal of livestock until rangelands have recovered
- Decrease or increase herd size within the limits of the permitted numbers
- Temporarily closing off water in a portion of a pasture to manipulate grazing pressure and intensity of use

- 995 • Use of salting and mineral blocks to aid in distribution, especially away from critical areas such
- 996 as riparian areas
- 997 • Herding livestock
- 998 • Excluding livestock from specific areas temporarily or permanently for other resource objectives
- 999 • Changing or limiting season of use to minimize impacts to riparian vegetation and water quality

1000 *Drought Preparation*

1001 Drought is inevitable in the southwest. The Standardized Precipitation Index (SPI) is a widely used index
1002 to characterize meteorological drought on a range of timescales

1003 (<https://www.ncdc.noaa.gov/oa/climate/research/prelim/drought/spi.html>). On short timescales, the
1004 SPI is closely related to soil moisture, while at longer timescales, the SPI can be related to groundwater
1005 and reservoir storage. It quantifies observed precipitation as a standardized departure from a selected
1006 probability distribution function that models the raw precipitation data (Keyantash and Dracup 2004).
1007 Regional Forest Service policy (USDA Forest Service, 2007) sets a threshold of - 1.00 SPI for a 12 month
1008 period, which triggers an evaluation of drought conditions. Once this is triggered, an interdisciplinary
1009 allotment evaluation is conducted to identify drought effects on an individual plant and landscape basis.
1010 Factors to consider in the evaluation include:

- 1011 • Local precipitation data: rain gauge data, departures from normal;
- 1012 • Current range management status: monitoring for desired conditions;
- 1013 • Stocking levels: current authorized livestock numbers, grazing strategy;
- 1014 • Available water sources: status of hauling water, stock tank levels, condition of improvements,
- 1015 well or spring production, presence of valuable riparian vegetation at the water source.

1016 When an allotment's 12 month SPI becomes positive, vegetation resources would be evaluated for
1017 indicators of drought recovery. The following are evaluated:

- 1018 • Recovery of vegetation: improved plant vigor, restoring litter production, restoring forage
- 1019 production;
- 1020 • Implementation of grazing: focus on recovery through incremental restocking and pasture rest.
- 1021

1022 Early communication is important. The TNF will work with the permittee to develop a drought
1023 preparedness guidelines to be included in the Allotment Management Plan. These guidelines would help
1024 frame initial communications related to the first signs of management impacts due to drought.
1025 Guidelines should address potential drought impacts to livestock and vegetation, identify known issues,
1026 and strategically plan for different scenarios while actively monitoring.

1027 *Off-Road Travel*

1028 The following on-going activities requiring motor vehicle use off designated routes would be authorized
1029 to conduct livestock grazing activities on National Forest System lands within the Tonto National Forest:

- 1030 • Off-road vehicle use by pickup, trailer, ATV, UTV, or motorcycle needed to transport materials or
- 1031 machinery to maintain or inspect structural range improvements (fences, corrals, pipelines,
- 1032 wells, windmills, and storage tanks, water delivery systems, troughs, earthen tanks) assigned in

Part 3 of the grazing permit as the permit holder's responsibility for maintenance. Existing routes or the shortest, most direct route to the improvement must be used and route construction (i.e. blading a path) would not be allowed without additional authorization.

- Using an off-road vehicle to place supplements in strategic locations for livestock management purposes may be authorized by the District Ranger in the Annual Operating Instructions when requested.

Vehicle use to gather or move livestock off-road would not be authorized. Cross-country motorized travel would not be allowed when conditions are such that cross-country travel would cause unacceptable natural and/or heritage resource damage. Off-road use of heavy equipment (i.e. backhoe, dozer, loader, etc.) may be authorized for range improvement development as needed. Cross-country travel to construct new range improvements and other off-road travel by the permit holder would be analyzed in the environmental analysis for this project. Before new improvements are approved, Heritage clearance would be obtained, including the route to access the development.

No additional Section 106 cultural compliance is required for specific limited-use authorizations already covered by separate decisions under the *National Environmental Policy Act* per The Region 3 Region-wide Travel Management protocol with the Arizona State Historic Preservation Officer. Motor vehicle use in designated wilderness areas would continue to be managed consistent with the provisions of the Wilderness Act [Section 4(d)(4)(2)] that provides for limited exceptions for grazing livestock as further defined in the Congressional Guidelines (FSM 2323.22)

Appendix

Table 16: Bar X Improvements by Pasture

Pasture	Improvement Name	Improvement Type
Bar X	Bar X Tank	tank
Colcord	Chance Tank	tank
	Lost Salt Tank	tank
	Lost Salt Two Tank	tank
	Estates Tank	tank
	Estates Corrals	corral
Cross Y	Cross Y Tank	tank
	Cross Y Tricktank	trick tank
Glasscock	Glasscock Tank	tank
Grasshopper	Grasshopper Tank	tank
	Grasshopper Tricktank	trick tank
	Unnamed	trough
	Grasshopper Storage	storage
	Unnamed	trough
Haigler	Jedy Spring	spring
	Jedy Tank	tank

	Haigler Storage	storage
	Unnamed	trough
Horse	Horse Tank	tank
	Mare/Horse/Pine Tank	tank
	Hospital Tank	tank
Lower Dry Creek	Lower Dry Storage	storage
	Lower Dry Tricktank	trick tank
	Unnamed	trough
	Unnamed	trough
Oxbow	Oxbow Tank	tank
	Jake Tank	tank
	Fillmore Tank	tank
	Oxbow Mountain Tank	tank
	Jake Tank Corral	corral
	Oxbow Canyon Tank	tank
Roscoe	Roscoe Tank	tank
	Roscoe Trap Tank	tank
Round Mountain	Saunders Spring	spring
	Round Mountain Corral	corral
	Round Mountain Spring	spring
Steer	Martin Tank	tank
	Hidden Tank	tank
	Diana Tank	tank
Upper Dry Creek	Dry Creek Spring	spring
	Cook Trap Tank	tank
	Cook Tank	tank
	Unnamed	trough
Walnut/Mcinturff	Double Tanks	tank
Westhole	Westhole Tank	tank
Windmill	Windmill Silo	storage
	Sombrero Tank	tank
	Mexican Tank	tank
	Buttes Corral	corral
	Cross Y Tricktank	trick tank
	Corner Storage	storage
	Unnamed	trough
	Unnamed	trough

1055 Table 17: Driveway Improvements by Pasture

Pasture	Improvement Name	Improvement Type
Cline Mesa	Cline Mesa Tank	tank
	Bryant Mtn Spring	spring
	Goldmine Tank	tank
	Amy Tank	tank
	Promised Land Tank	tank
	Little Walnut Trough	trough
	Little Walnut Storage	storage
	Mailbox Tank	tank
Lost Salt	Powerline Tank	tank
	Colcord Mountain Spring	spring
	Naegelin Canyon Corral	corral
	Sterile Tank	tank
	Bluebird Tank	tank
McInturff	Unnamed	trough
	Unnamed	storage
	Mcinturff Tricktank	trick tank
	Pine Creek Well	well
	Unnamed	trough
	Cook's Tricktank	trick tank
	Trail Bike Tank	tank
	Mcinturff Tank	tank
Naegelin	Naegelin Canyon Tank	tank
	Naeglin Rim Tank	tank
	Tabletop Tank	tank
	Wapati Tank	tank
	Pinetree Tank	tank
	Corvus Tank	tank
	First Tank	tank
	Rocky Tank	tank
	Maya Tank	tank
	Trigger Tricktank	trick tank
	Unnamed	trough
Potato Butte	Overlook Tank	tank
Walnut	Steve Tank	tank
	Ruth Tank	tank
	Granite Tank	tank
Windmill	Buttes Well	well

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